AN OLIGONEURID FROM NORTH AMERICA*

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Despite the many serious and wholly justifiable objections to describing a single specimen, I am following such a procedure for these reasons: (1) The specimen under consideration is obviously a member of an exotic family about which our information is meager, and this is the first record of the family from North America; (2) the collecting methods employed give a clue as to why the nymphs of this species have not been taken previously.

The specimen is an almost mature male nymph and was collected from the White River at Decker, Indiana, on July 27, 1932, by Stacey Denham, who kindly forwarded it to me. Its description is as follows:

Length, including tails, 12.5 mm.; exclusive of tails, 10 mm. Head roughly semi-globose with the mouth parts projecting posterio-ventrally; compound eyes huge, occupying most of the area of the head, and contiguous along the mid-line, thus completely eliminating vertex except for a small area anteriorly. Nymphal eyes undivided; those of the adult as seen through the thin chitin show no indication of being divided. Lateral ocelli wedged between the antennæ and compound eyes, being displaced so that they are anterior and ventral to the median ocellus which lies in an angle formed by anterior margins of eyes. Fronto-clypeal area greatly reduced; along edge of this area and the ventral edge of the parietal areas a fairly dense fringe of short setæ. Antennæ twelve-jointed, short and stubby; scape short and heavy; pedicel almost as heavy and much longer, comprising a third of the total length of the antennæ; remaining segments subequal and gradually decreasing in diameter toward the tip.

Mouth parts typically oligoneurid; labrum (Fig. 10) uniformly pilose over the anterior surface; mandibles (Fig. 5) with a large, well developed molar area, and reduced, smallish incisors,

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the outer one having three small teeth at tip and the inner one appearing like a huge, sharp-pointed seta; the lacina mobilis as long as outer incisor; maxillæ (Fig. 1) with semi-lanceolate galea-lacinia; palps two-jointed; basal segment short and the distal one long, large, curved and finger-like; at the base of maxillæ a large tuft of respiratory filaments as in *Isonychia;* labium (Fig. 4) heavily pilose; glossæ small and lying dorsal to the larger paraglossæ; palps two-jointed, the second large and broadly expanded.

Thorax short and compact; the anterior and posterior margins of the pronotum straight and parallel. An extension of the posterio-lateral area of the pronotum extending as a broad lobe-like projection posterior to the prothoracic leg (Fig. 9). Wing pads large, thick, and blackish as in all nymphs just before emergence; the metathoracic wings of the adult apparently good-sized.

Legs (Figs. 7, 8, 9) peculiar in that the coxæ and trochanters of the meso- and metathoracic legs are very long and robust. Coxa of fore-leg about three-fourths as long as femur; trochanter small; tibia forming a flat blade-like structure about one and one-half times the length of femur and ending in a blunt semi-hook, on the outer side of which is a small unsegmented papilla-like structure which represents the tarsus; inner side of basal half of femur and middle three-fourths of tibia bearing extremely long slender setæ which are secondarily dissected; a patch of long slender setæ on inner surface of coxa; outer surface of coxa, trochanter and femur sparsely setose. Coxa of second leg subequal to femur, longer than any other part and covered with setæ on outer surface; trochanter robust and longer than tibia or tarsus, and expanded and rounded on medio-ventral surface, this surface being covered with long robust setæ; femur covered with robust setæ; tarsus subequal to tibia and both sparsely covered with short setæ; tarsus ending in a single slender claw. Coxa of hind leg heavy and long, representing one-third of entire length of leg, and fairly densely covered by long slender setæ; short, semi-globose trochanter covered with long slender setæ on ventral surface; femur, tibia, and tarsus, which decrease in length and robustness in order named, clothed with long, heavy setæ; tarsus tipped by long slender claw. Adult

legs as seen through the nymphal chitin appearing very slender and weak.

Abdomen long, slender, and cylindrical; segments gradually increasing in length and decreasing in diameter from first to ninth inclusive; tenth segment considerably smaller than any other; tergites uniformly covered with short, stubby setæ; on anterior sternites setæ much denser, longer, and finer than on corresponding tergites, with a gradual reduction in density and length of setæ on more posterior sternites until ninth sternite matches ninth tergite; in addition a distinct fringe on posterior edge of all sternites due to increased density and length of setæ. Through the thin nymphal chitin, it can be seen that the adult would have a broad dark, irregular band on its posterior edge of each abdominal tergite increasing in width posteriorly until that of the ninth segment would occupy almost half of the tergite; no indications of posterio-lateral spines on segments 1 to 7 inclusive; lateral spines on segments 8 and 9 short, not extending beyond posterior margin of their respective segments.

Gills present on abdominal segments 1 to 7 inclusive; last six (Figs. 2, 3) consist of single, slender, flat, plate-like structures which extend posterio-laterally from posterior angle of each segment, apparently none having any tracheæ; first gill (Fig. 11) a huge, highly dissected plate-like structure that has migrated and rotated so that it extends ventrally and parallel to the longitudinal axis of the body and lies between the posterior pair of legs. It is completely invisible from a dorsal view and when first seen seems to arise from the thorax; also there is a median, finger-like, posteriorly directed process from posterior edge of first sternite.

Nymphal genital apparatus appearing as a truncate cone with a concave top surface. It is impossible to determine what the adult genitalia would be like. Three subequal caudal tails; lateral ones having a dense fringe of long, slender setæ on inner side and a similar fringe on both sides of middle tail; laterals with 25 segments, the middle tail 22.

It is possible from the structure of the nymph to determine something about its ecology. The long, slender, cylindrical shape eliminates the possibility of its living under stones, etc., as *Hep-*

tagenia and its relatives do. The lack of digging apparatus indicates it is not a burrower. The immaculate condition of the specimen shows it not to be a sprawler like *Cœnis,* or a clamberer like certain *Ephemerella,* and the peculiar build of the gills, especially the huge first gill, eliminates the chance of its being a swimmer amongst the vegetation such as *Callibœtis* and to some extent *Siphlonurus.* Superficially the specimen looks like *Isonychia.* Inspection of the first leg and mouth parts confirms the notion that this species probably lives and feeds much like *Isonychia, i.e.,* it lives on the bottom in a place where the current is fairly rapid and, by facing the current, it is able to sift out its food with the long setæ that are found on the front legs. There are, however, certain obvious and striking differences between *Isonychia* and this specimen: (1) In the relative proportion of the various parts of the legs, as well as their disposition in relation to the rest of the body; (2) in the arrangement of the gills: in *Isonychia* all seven pairs are quite similar in structure and location, while in this species the task of respiration is taken over mainly by the first pair which is carefully protected between the metathoracic legs. It is necessary to consider these structures further in order to comprehend how the nymph lives.

The coxæ all extend directly downwards and the fore-coxæ are less than half the length of the meso- and metacoxæ. The fore-leg (Fig. 9) is held somewhat like the arm of a boxer when he fends off a blow that is directed toward his face. From the mesocoxæ the trochanter and femur extend outward and upward while the tibia and tarsi continue outward and downward so that the rounded setose inner surface of the trochanter and the end of the tarsus are all that come in contact with the substratum. From the metacoxæ the remainder of the leg extends at a right angle straight backwards and parallel to the longitudinal axis of the body so that the anterior surfaces of the trochanter, femur, tibia and tarsus come into contact with the substratum. Thus the body of the nymph and also the first pair of gills which are located ventrally are held away from the substratum by the long meso- and metacoxæ, while the outwardly extended mesothoracic legs keep the specimen from rolling sidewise and the posteriorly directed metathoracic legs keep the nymph on a level keel facing

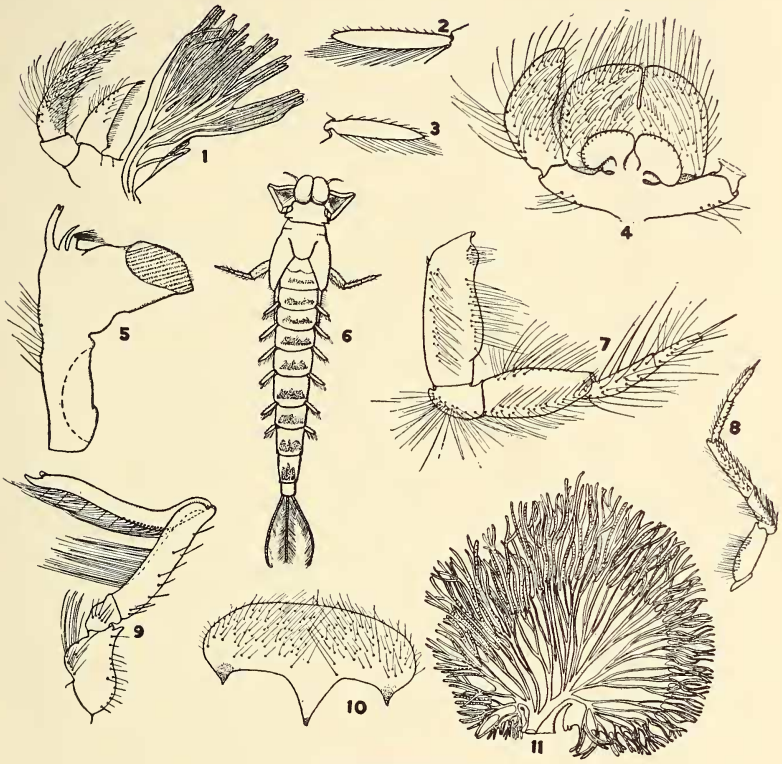
into the current. Since the fore-coxæ are short, the fore-leg moves freely in the area between the substratum and the body, and the long hairs filter the water, thus insuring food for the nymph and simultaneously insuring filtered water for the first gill. This condition, plus the fact that the main part of respiration has been taken over by this protected gill, indicates that the nymph lives in an environment where there are a great many small particles in suspension. This is in accord with the statement of Mr. Denham that the substratum upon which this specimen lived was sandy. When we know more about this species, I think we will find that the nymph lives in sandy streams, probably at the riffle end of sand bars.

Phylogenetically the nymph shows no relation to *Isonychia.* A comparison of the general shape, gills, legs—especially the first leg—, and mouth parts with those of the nymph of *Oligoneuriella, Elassoneuria,* and *Noya* indicates without a doubt that it is a member of the family Oligoneuridæ. The type of this family is *Oligoneuria anomala* from Brazil, the nymph of which is unknown. Very closely related is *Oligoneuriella rhenana* of Europe. The nymph of *O. rhenana,* which is well known, shows a decided resemblance to the specimen described above. There is, however, in Central America the genus *Homeoneuria* which is also known from adult specimens only. In view of these facts, I am refraining from giving this specimen any name. The close similarity of the nymph to that of *Oligoneuriella* indicates that it may be a member of the genus *Oligoneuria,* since the adults of these two genera are closely related.

Why has this species never been collected before? The method of capture gives a clue. The specimen was taken from the deeper waters of a sandy river by means of a Peterson dredge. Most collections of mayfly nymphs are made in small streams, ponds, etc., and along the edges of larger bodies such as lakes and rivers. Those species that are peculiar to the deeper waters of lakes and especially of rivers are still poorly known. The adult of this species probably emerges, mates, deposits its eggs, and dies all in a single night. This is somewhat confirmed by the fact that the adult legs would probably be very weak, if not almost functionless as is the case with *Campsurus* and *Ephoron.* Unlike these, however, the adult of this specimen is probably negatively phototropic.

PLATE II

Figure 1. Right maxilla. ×64.
Figure 2. Second gill. ×60.
Figure 3. Seventh gill. ×60.
Figure 4. Labium. ×64.
Figure 5. Right mandible. ×130.
Figure 6. Dorsal view of nymph. ×12.
Figure 7. Metathoracic leg. ×50.
Figure 8. Mesothoracic leg. ×21.
Figure 9. Prothoracic leg. ×50.
Figure 10. Labrum. ×130.
Figure 11. First gill. ×21.



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